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10/824,197

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Daniel Yap

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HRL LABORATORIES, LLC  
3011 MALIBU CANYON RD.  
MALIBU, CA 90265

EXAMINER

WANG, QUAN ZHEN

ART UNIT

PAPER NUMBER

2613

MAIL DATE

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**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

## Office Action Summary

Application No.

10/824,197

Applicant(s)

YAP ET AL.

Examiner

Quan-Zhen Wang

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 22 June 2007.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-179 is/are pending in the application.
- 4a) Of the above claim(s) 2-28, 49-66, 80-86 and 119-179 is/are withdrawn from consideration.
- 5) ☒ Claim(s) 87-118 is/are allowed.
- 6) ☒ Claim(s) 1 and 48 is/are rejected.
- 7) ☒ Claim(s) 29-47 and 67-79 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO/SB/08)  
Paper No(s)/Mail Date See Continuation Sheet.
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_.
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: \_\_\_\_\_.

Continuation of Attachment(s) 3). Information Disclosure Statement(s) (PTO/SB/08), Paper No(s)/Mail Date  
:1/23/06,4/11/06,4/15/06,10/27/06.

## DETAILED ACTION

### *Election/Restrictions*

1. Applicant's election without traverse of Species VI in the reply filed on June 24, 2007 is acknowledged. Applicant elected the claims 29-47, 67-79, 87-105, and 106-118. Because claim 29 depends on claim 1 and claim 67 depends on claim 48, therefore, claims 1 and 48 are also included in the elected claims. Claims 1, 29-48, 67-79, 87-105, and 106-118 are examined. Claims 2-28, 49-66, 80-86, and 119-179 are withdrawn from further consideration pursuant to 37 CFR 1.142(b) as being drawn to a nonelected Species, there being no allowable generic or linking claim.

### *Claim Rejections - 35 USC § 102*

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

3. Claim 48 is rejected under 35 U.S.C. 102(b) as being clearly anticipated by Tsao et al. (S.L. Tsao et al., "Phaselocked tunable subcarrier comb generator", Electronics Letters vol. 30, Nov. 1994, pages 2059-2060).

Regarding claim 48, Tsao discloses a method of generating an agile spread spectrum waveform (fig. 1), the method comprising: generating multi-tone optical comb

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(fig. 1, the output from OCG); generate a wavelength-tunable frequency (fig. 1, output from tunable VCO laser); and optical combining the optical comb with the wavelength-tunable frequency to heterodyne the lightwave waveform suitable for subsequent heterodyning ((fig. 1, the 2x2 optical coupler).

4. Claim 48 is rejected under 35 U.S.C. 102(a) as being clearly anticipated by Hall et al. (U.S. Patent US 6,201,638 B1).

Regarding claim 48, Hall discloses a method of generating an agile spread spectrum waveform (fig. 5), the method comprising: generating multi-tone optical comb (fig. 5, the OFC's comb output 41 and 45); generate a wavelength-tunable frequency (fig. 5, output from tunable laser 48); and optical combining the optical comb with the wavelength-tunable frequency to heterodyne the lightwave waveform suitable for subsequent heterodyning ((fig. 5, mixing of 45 and 47).

#### ***Claim Rejections - 35 USC § 103***

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

6. Claim 1 is rejected under 35 U.S.C. 103(a) as being unpatentable over Logan Jr. (Ronald T. Logan Jr., "All-optical heterodyne RF signal generation using a mode-locked-laser frequency comb: theory and experiments", Microwave Symposium Digest, 2000

IEEE MTT-S International Volume 3, June 2000 Pages: 1741–1744) in view of Gliese (U. Gliese et al., “A wideband heterodyne optical phase-locked loop for generation of 3-18 GHz microwave carriers”, IEEE Photonics Technology Letters, Volume 4, August 1992, Pages: 936 – 938).

Regarding claim 1, Logan teaches a waveform generator comprising: (a) photonic oscillator comprising a multi-tone optical comb generator (fig. 1); a photodetector (connected to the out put of fig. 1) to generate an agile spread spectrum waveform (fig. 2). Logan differs from the claimed invention in that Logan does not specifically teach that the system comprises phase locked laser to provide a frequency translation reference. However, it is well known in the art to use a phase locked laser to provide a frequency translation reference. For example, Gliese discloses to use a phase locked laser (fig. 1, Ts-laser) to provide a frequency translation reference. Therefore, it would have been obvious for one of ordinary skill in the art at the time when the invention was made to incorporate a phase locked laser, as it is taught by Gliese, in the system of Logan in order to reduce the phase noise.

***Allowable Subject Matter***

7. Claims 29-47 and 67-79 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.
8. Claims 87-118 are allowed.

9. The following is an examiner's statement of reasons for allowance:

Claims 29-47 would be allowable since the prior art of record does not teach or suggest in combination a first optical branch comprising a first optical delay element; a second optical branch comprising a main optical fiber having a forward direction of light propagation; a third optical branch, said third optical branch providing a Stokes beam to said second optical branch, said Stokes beam propagating in said main optical fiber in a direction opposite to said forward direction of light propagation; and a common path, said common path comprising: an optical portion having an optical modulator providing an optical signal to said first optical branch, said second optical branch, and said third optical branch; and an electrical portion having at least one photodetector coupled to said first optical branch and said second optical branch, said at least one photodetector producing an electrical signal coupled to said optical modulator, in addition to other cited limitations.

Claims 67-79 would be allowable since the prior art of record does not teach or suggest in combination the step of generating a multi-tone optical comb comprises: modulating an optical signal from a laser with an optical modulator to provide a modulated optical signal; delaying said modulated optical signal in a first optical branch to provide a first delayed optical signal; propagating said modulated optical signal in a forward direction in a second optical branch to provide a second delayed optical signal; generating Stokes light from said modulated optical signal; injecting said Stokes light into said second optical branch so that said Stokes light propagates in a reverse direction to said modulated optical signal in said second optical branch, wherein said

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Stokes light acts as a seed for stimulated Brillouin scattering in said second optical branch; photodetecting said first delayed optical signal and said second delayed optical signal to produce an electrical signal; and controlling said optical modulator with said electrical signal, in addition to other cited limitations.

Claims 87-105 are allowed since the prior art of record does not teach or suggest in combination a multi-tone photonic oscillator comprising: a laser producing an optical carrier wave; a first optical branch comprising a first optical delay element; a second optical branch comprising a main optical fiber having a forward direction of light propagation; a third optical branch, said third optical branch providing a Stokes beam to said second optical branch, said Stokes beam propagating in said main optical fiber in a direction opposite to said forward direction of light propagation; and a common path, said common path comprising: an optical portion having an optical modulator receiving said optical carrier wave and providing an optical signal to said first optical branch, said second optical branch, and said third optical branch; and, an electrical portion having at least one photodetector coupled to said first optical branch and said second optical branch, said at least one photodetector producing an electrical signal coupled to said optical modulator, in addition to other cited limitations.

Claims 106-118 are allowed since the prior art of record does not teach or suggest in combination a method of generating a multi-tone optical comb, the method comprising the steps of: modulating an optical signal from a laser with an optical modulator to provide a modulated optical signal; delaying said modulated optical signal in a first optical branch to provide a first delayed optical signal; propagating said



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modulated optical signal in a forward direction in a second optical branch to provide a second delayed optical signal; generating Stokes light from said modulated optical signal; injecting said Stokes light into said second optical branch so that said Stokes light propagates in a reverse direction to said modulated optical signal in said second optical branch, wherein said Stokes light acts as a seed for stimulated Brillouin scattering in said second optical branch; photodetecting said first delayed optical signal and said second delayed optical signal to produce an electrical signal; and controlling said optical modulator with said electrical signal, in addition to other cited limitations.

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

### ***Conclusion***

10. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Logan (U.S. Patent US 5,710,651) discloses a remote millimeter-wave antenna fiber optic communication system using dual optical signal with millimeter-wave beat frequency.

11. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Quan-Zhen Wang whose telephone number is (571)

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272-3114. The examiner can normally be reached on 9:00 AM - 5:00 PM, Monday - Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jason Chan can be reached on (571) 272-3022. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

qzw  
7/31/2007



Quan-Zhen Wang